Data Collection & Processing Report – Utah, Bears Ears NM

NSF Grant Title: Dynamic Impacts of Environmental Change and Biomass Harvesting on Woodland Ecosystems and Traditional Livelihoods

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Data Collection Summary:

Collection Dates, # Flights:	June 2nd, 2018 (DOY153-154), 2 Flights: A 15:21-19:45 UTC, B 20:16-00:45 UTC
Aircraft, Equipment:	Piper Navajo PA-31-350 (Tail No.: N640WA), LIDAR: Optech Titan (14 SEN/CON 340)
Flight Plan Parameters:	Flying Height: 600 m AGL, Swath Width: 460 m, Overlap: 50%, Line Spacing: 230 m
Equipment Parameters:	PRF: 125 kHz, Scan Frequency: 30 Hz, Scan Angle: ± 23-2°
Planned Laser Pulse Density:	Mean 21.36 pulse/m²
Requested/Collected Area:	159.67 / 229.49 km² (collected area computed from average DEM/DSM filled nodes)

GNSS Reference Station Summary:

1.	NCALM - KBDG	37 34 51.52901 109 28 58.14070 , 1769.898 m NAD83 / NAVD88 Geoid 12B
2.	NCALM - UTBridges	37 32 50.10396 N, 109 59 7.07233 W, 1967.458 m NAD83 / NAVD88 Geoid 12B

Data Products Summary:

Horizontal / Vertical Datum:	NAD83(2011) / NAVD88 (GEOID12B)
Projection / Units:	UTM Zone 12N / meters
Point Cloud Tiles:	1116 total 500 m × 500 m tiles in LAS format (Version 1.2), classified into ground, low vegetation (hagl ≤ AGL 3 m), medium vegetation (3 m < hagl ≤ 10 m), high vegetation (hagl > 10 m), outliers as default and isolated.
Raster Sections	Five raster sections, see Figure 1.
Bare-Earth Elevation Model:	ESRI FLT format @ 50 cm grid spacing from classified ground returns
Bare-Earth Hillshade:	ESRI-created raster @ 50 cm grid spacing using parameters (315° Azimuth, 45° Elev).
First-Surface Elevation Model:	ESRI FLT format @ 50 cm resolution based only on first returns from channel 2.
First-Surface Hillshade:	ESRI-created raster @ 50 cm grid spacing using parameters (315° Azimuth, 45° Elev).

A detailed summary of the equipment and processing techniques used by NCALM is included in the Data Collection & Processing Summary.

Special notes:

1. The steep and in some cases vertical cliffs walls with short vegetation on the cliff edges makes the ground classification extremely difficult. We implemented a three-stage ground classification algorithm that incorporated factors such as slope, ground return density and return height variation to overcome this challenge. However, the classification will not be perfect. There will be some vegetation (minimal amounts) along some of the cliff edges and some of the returns from the cliff walls won't be classified as ground.

2. We conducted extensive height validation of the point cloud and raster datasets. The most comprehensive one was conducted using the bare earth DEMs and considered 5,582 kinematic GPS check points. This validation yielded a standard deviation (precision) of 0.03 meters with a mean error (accuracy) of 0.0153 meters. The most comprehensive validation using individual lidar returns considered 1,358 kinematic GPS check points. This validation yielded a standard deviation (precision) of 0.038 meters with a mean error (accuracy) of -0.01784 meters.

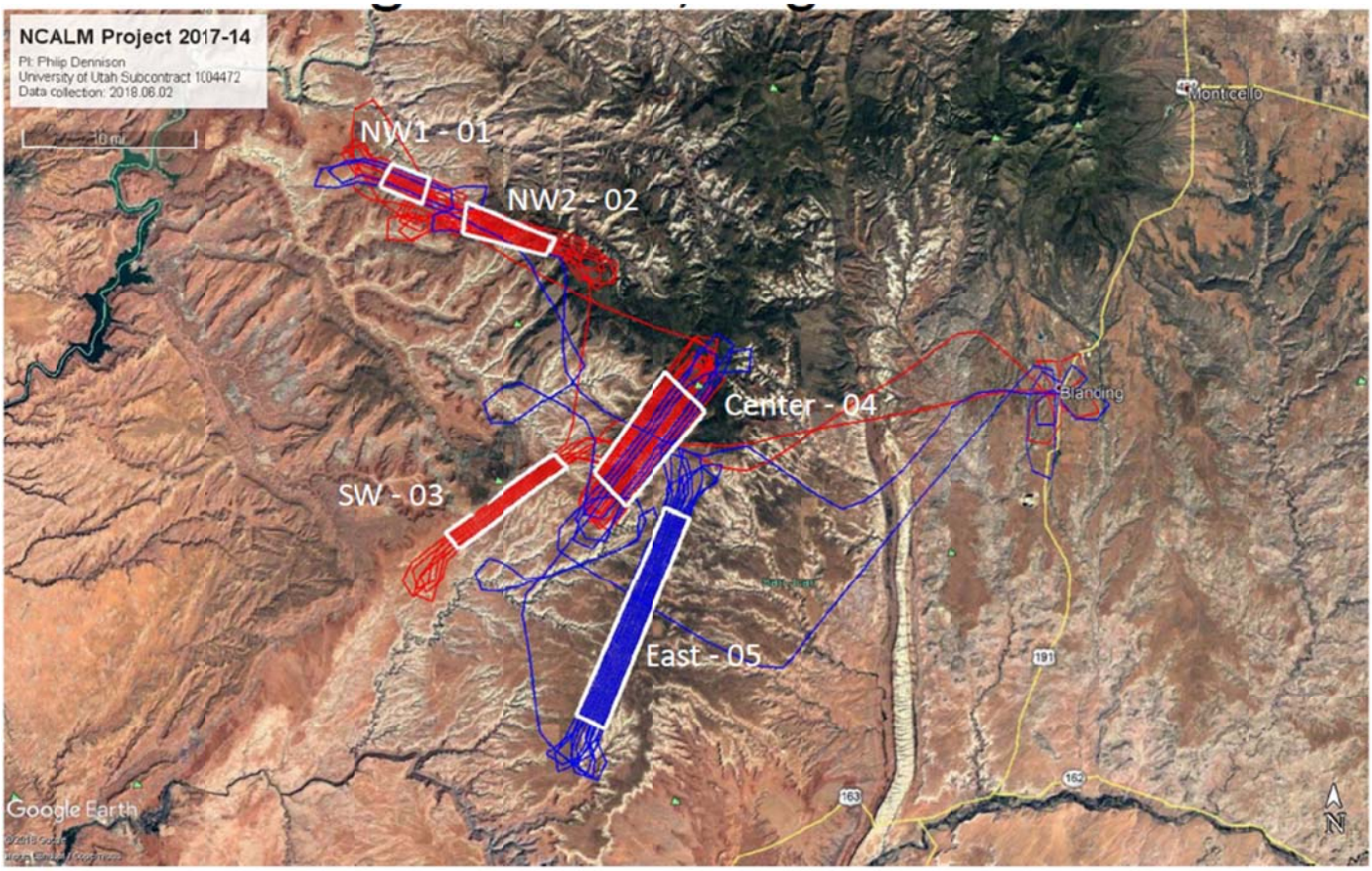

Figure 1. Survey polygon and flight trajectories.